



DC FAN LIFE EXPERIMENT REPORT

Available for these models with lower speed and same physical structure. All model may be followed by Rxx or Fxx series suffixes. This test report applies to EFB 40x40x20.0 mm series as the right table	EFB0412HHD-8F1Q	EFB0424VHD-BM50		
	EFB0424LD-SE28			
	EFB0424VHD-C			

Representative Test P/N : EFB0412VHD-CF00	
Equipment: 1.Oven: E24-F0055	On/Off Cycles: Every 500 hours

◎ **L₁₀ Expectancy: 70,000 hours minimum @ fan rated voltage and the temperature of 40 °C**

According to the equation for **Weibull distribution**, **MTTF ≐ 7×L₁₀ = 490,000 hours**

And we rely on a zero failure Weibull test strategy and accelerated testing technique, to determine the total test time (t) for verifying the above life estimation by the equations,

$$t = 1.036 \times \text{MTTF} \times [(B_{r,c}) \div n]^{0.91} \div A_F, \text{ and } A_F = 2^{(T_s - T_u)/10}$$

where, (B_{r,c}) is Poisson distribution factor with the failure number of r equal to 0 and the decimal confidence level of c equal to 0.90(90%).

Stress/Elevated Temperature T _s (°C)	Unstress Temperature T _u (°C)	Acceleration Factor A _F	Quantity of Test Devices n (pcs)	Poisson Distribution Factor B _{r,c}	Required test time with zero failure t (hours)	Actual test time with zero failure t (hours)	Verified MTTF 40 °C (hours)	Verified L ₁₀ 40 °C (hours)
70	40	8.00	56	2.303	3,478	8,360.0	1,177,878	168,268

Test Progress:

Date for Test Beginning	Date for Test Termination (at least)	Current Test Status			Current Total Test Time (hours)
2008/5/9 11:30 AM	2009/1/1 5:16 PM	<input type="checkbox"/> In process	<input type="checkbox"/> In process (exceed requested)	<input checked="" type="checkbox"/> Termination	8360.0

Herewith, we could assume as right on the basis of above test result. Besides, if the actual test time exceed the required, it comes out that those fans' L₁₀ expectancy and MTTF are greater than the warrant. (MTTF: means Mean Time To Failures, it should be used in a non-repairable system setting. Now we show the MTTF in our life report, that's because we will not repair the failed fans during life experiment. MTBF: means Mean Time Between failures, it should be used in a repairable system setting.

Temperature for MTTF Estimation (°C)	Acceleration Factor A _F	Estimated MTTF (hours)	Estimated L ₁₀ (hours)
25	22.63	3,331,541	475,934
30	16.00	2,355,755	336,536
40	8.00	1,177,878	168,268
50	4.00	588,939	84,134
60	2.00	294,469	42,067
70	1.00	147,235	21,034

- Fan permission criteria for the measurement after test :
1. Speed can not drop of ≥ 15% below the original measured rpm.
 2. Current cannot increase > 15% of original measure current.
 3. Noise cannot >3dB over the original measure noise.

Test Result	<input checked="" type="checkbox"/> Accept
	<input type="checkbox"/> Reject

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG08FNL063	2216.00	2009/7/29	Nan Yang	Zenny Lei



DC FAN FUNCTION TEST RECORD FOR LIFE EXPERIMENT

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EFB0412HHD-8F1Q	EFB0424VHD-BM50
EFB0424LD-SE28	
EFB0424VHD-C	

Required Test Time (hrs)	Date for Test Beginning	Date for Test Termination	Sample Size (pcs):	Failure (pcs):	Current Total Test Time (hrs)
3,478	2008/5/9 11:30 AM	2009/1/1 5:16 PM	56	0	8360.0

Representative Test P/N : EFB0412VHD-CF00	Current Test Status	<input type="checkbox"/>	In process	<input type="checkbox"/>	In process (exceed requested)	<input checked="" type="checkbox"/>	Termination
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Equipment: 1.Oven: E24-F0055 On/Off Cycles: Every 500 hours

Test Data Between Initial Test and Final Test

Sample No.	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation (%)	Initial Test	Final Test	Deviation
	Current Spec. (mA) 180 Max.	Current Spec. (mA) 180 Max.		Speed Spec. (RPM) 8100-9900	Speed Spec. (RPM) 8100-9900		Noise Spec. (dB A) 39.0 Max	Noise Spec. (dB A) 39.0 Max	
1	152	112	-26.3	8347	9613	15.2	34.3	36.5	2.2
2	163	113	-30.7	8434	9583	13.6	34.5	36.4	1.9
3	160	117	-26.9	8351	9782	17.1	34.1	36.8	2.7
4	145	113	-22.1	8454	9493	12.3	34.7	37.1	2.4
5	157	114	-27.4	8492	9696	14.2	34.9	36.3	1.4
6	151	112	-25.8	8266	9574	15.8	34.4	36.7	2.3
7	157	115	-26.8	8588	9845	14.6	34.9	36.1	1.2
8	149	116	-22.1	8464	9586	13.3	34.7	36.7	2.0
9	155	112	-27.7	8499	9561	12.5	34.5	36.4	1.9
10	147	114	-22.4	8513	9691	13.8	34.0	36.3	2.3
11	168	112	-33.3	8210	9644	17.5	34.7	36.5	1.8
12	153	111	-27.5	8328	9672	16.1	34.5	36.1	1.6
13	165	111	-32.7	8243	9630	16.8	34.2	36.2	2.0
14	154	115	-25.3	8414	9774	16.2	34.9	36.4	1.5
15	157	118	-24.8	8261	9725	17.7	34.4	36.3	1.9
16	164	116	-29.3	8360	9764	16.8	34.7	36.5	1.8
17	155	113	-27.1	8257	9650	16.9	34.2	36.7	2.5
18	165	110	-33.3	8349	9650	15.6	34.9	36.2	1.3
19	156	110	-29.5	8465	9565	13.0	34.6	36.6	2.0
20	155	110	-29.0	8435	9628	14.1	34.2	36.5	2.3
21	151	115	-23.8	8426	9503	12.8	34.5	36.1	1.6
22	157	113	-28.0	8353	9701	16.1	34.7	36.2	1.5
23	145	109	-24.8	8519	9693	13.8	34.4	36.4	2.0
24	155	113	-27.1	8251	9689	17.4	34.9	36.3	1.4
25	158	111	-29.7	8340	9551	14.5	34.2	36.5	2.3
26	161	112	-30.4	8336	9646	15.7	34.4	36.7	2.3
27	149	115	-22.8	8537	9767	14.4	34.7	36.7	2.0
28	156	115	-26.3	8238	9852	19.6	34.9	36.5	1.6
29	161	112	-30.4	8281	9586	15.8	34.9	36.6	1.7
30	154	115	-25.3	8236	9542	15.9	34.5	36.8	2.3
31	163	113	-30.7	8397	9582	14.1	34.7	36.9	2.2
32	149	112	-24.8	8356	9555	14.3	34.2	36.1	1.9
33	149	111	-25.5	8736	9659	10.6	34.7	36.4	1.7
34	127	110	-13.4	8807	9445	7.2	34.9	36.9	2.0
35	165	114	-30.9	8169	9541	16.8	34.3	36.5	2.2

QE File No.	Time-out for function test or others (hours)	Issued Date	Reported By	Approved By
DG08FNL063	2216.00	2009/7/29	Nan Yang	Zenny Lei



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36	154	115	-25.3	8294	9813	18.3	34.4	36.6	2.2
37	165	110	-33.3	8320	9594	15.3	34.1	36.9	2.8
38	152	113	-25.7	8347	9876	18.3	34.6	36.4	1.8
39	169	113	-33.1	8135	9729	19.6	34.4	36.5	2.1
40	152	108	-28.9	8438	9712	15.1	34.9	36.4	1.5
41	154	116	-24.7	8407	9685	15.2	34.4	36.5	2.1
42	156	115	-26.3	8197	9657	17.8	34.5	36.9	2.4
43	167	114	-31.7	8111	9839	21.3	34.7	36.7	2.0
44	159	116	-27.0	8105	9559	17.9	34.2	36.5	2.3
45	162	115	-29.0	8228	9541	16.0	34.5	35.5	1.0
46	154	112	-27.3	8529	9610	12.7	34.7	36.5	1.8
47	155	110	-29.0	8551	9565	11.9	34.2	35.9	1.7
48	157	112	-28.7	8262	9536	15.4	34.5	36.1	1.6
49	167	112	-32.9	8231	9710	18.0	34.9	36.4	1.5
50	159	111	-30.2	8199	9666	17.9	34.5	35.9	1.4
51	158	111	-29.7	8477	9718	14.6	34.0	36.1	2.1
52	155	116	-25.2	8413	9805	16.5	34.7	36.5	1.8
53	150	112	-25.3	8576	9620	12.2	34.5	36.5	2.0
54	141	112	-20.6	8629	9693	12.3	34.7	35.7	1.0
55	166	113	-31.9	8272	9535	15.3	34.4	36.2	1.8
56	157	116	-26.1	8388	9784	16.6	34.8	36.5	1.7
X-Bar	156.0	113.0	-	8371.8	9655.1	-	34.53	36.43	-
σ	7.421	2.199	-	147.870	100.931	-	0.261	0.304	-

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